Department of Environmental Quality
Water Bureau Measures of Success
November 13, 2009

Mission: CLEAN AND SAFE WATER

Welcome to the Water Bureau's Measures of Success. This is our attempt to define the expected outcomes for many of the issues facing the water program. We work hard on many activities that affect and/or measure the quality of the waters of our State, and this is how we propose to measure the success in having clean and safe water.

These measures are primarily based on what we can presently measure. There are additional outcomes that are not presently included but desirable. We anticipate that these outcomes and measures will change as we get better at defining and measuring them.

We are providing this for your input and suggestions on these Measures of Success. Please send your comments to William Creal at crealw@michigan.gov.

The mission of the Water Bureau is to make Michigan's waters safe and clean for drinking, recreating, fishing, and healthy aquatic ecosystems. Five major goals provide definition to this mission: (1) Ensure Safe Drinking Water; (2) Protect Groundwater; (3) Enhance Recreational Waters; (4) Ensure Consumable Fish; and (5) Protect and Restore Aquatic Ecosystems. For each major goal measurable outcomes (measures of success) are identified.

The use of outcome oriented goals and measurements serves to focus efforts, motivate staff, communicate progress, improve environmental health and compliance conditions, increase our accountability, and foster collaboration. We intend to use these goals and measurements to enlist external assistance, encourage cooperation across organizational boundaries, and encourage discussion about strategic adjustments and priority trade-offs. We also intend to use these goals and measurements to align the process and activity targets to support the attainment of the outcome focused goals. The goals set here are expected to be reviewed and modified as appropriate.

The use of measurements associated with the goals is essential. Measurements provide insights in many areas, including informed priority setting and daily decisions; finding problems and assessing their relative importance; identifying preventable causal factors; and communicating progress and problems. Measurement reinforces the importance of a goal and managerial priorities, and helps us gauge how well prior actions worked and when adjustments are needed.

The goals we are identifying will, on occasion, require us to stretch to meet them. While attainment of these goals is the ideal, the objective is the development of cogent strategies to meet them. These strategies would guide the Water Bureau in measurement

of progress toward the goals, regular use of the data to make informed decisions, and regular reporting on goals, progress, and strategies, including reporting to the public.

The following five major goals are intended to represent the outcomes that are expected from the Water Bureau. These major goals are rather self-evident, but the specific measurements established for each goal are established with consideration of what is needed to measure attainment of the goal, as well as what we currently can measure and report on.

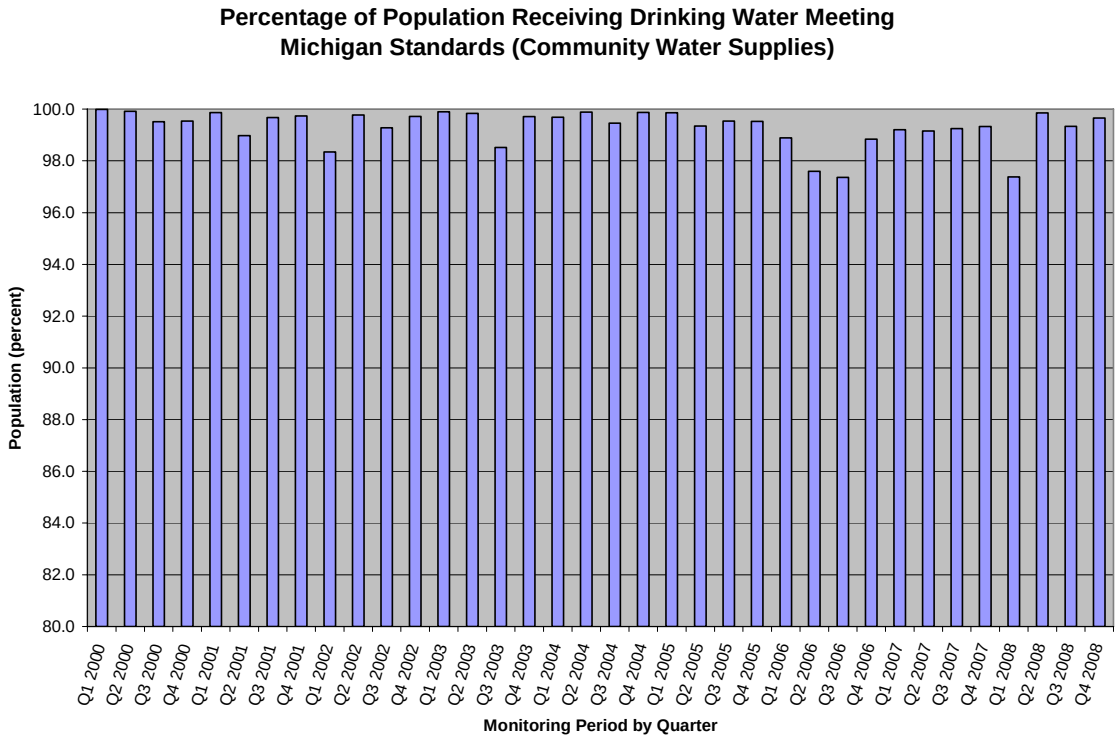
Limited interpretation of the results is provided. The scale used to portray progress toward meeting the goal goes from Excellent to Poor (Excellent, Very Good, Good, Poor) with the category "Don't know yet" included for where we do not have measurements yet to interpret.

If you have questions or comments on this document, please contact Mary Ann Hanifan, at hanifanm@michigan.gov. We are especially interested in comments regarding appropriate goals, measures, and evaluation.

Major Goal 1: Ensure Safe Drinking Water:

Goal 1: By 2015, 100 percent of the population served by community water systems (CWS) will receive drinking water that meets all applicable health-based drinking water standards through effective treatment and source water protection.

Measure: Percent of population served by CWS with no reported violations of health based standards.



How are we doing? Excellent
Comments: This goal is very close to being met with results routinely near 100 percent. We recognize that routinely achieving 100 percent will be difficult, because there will likely always be some incidents that prevent this achievement. This is why we have developed a program response "evaluation" to help us understand where we are, and perhaps lead to improving our results.

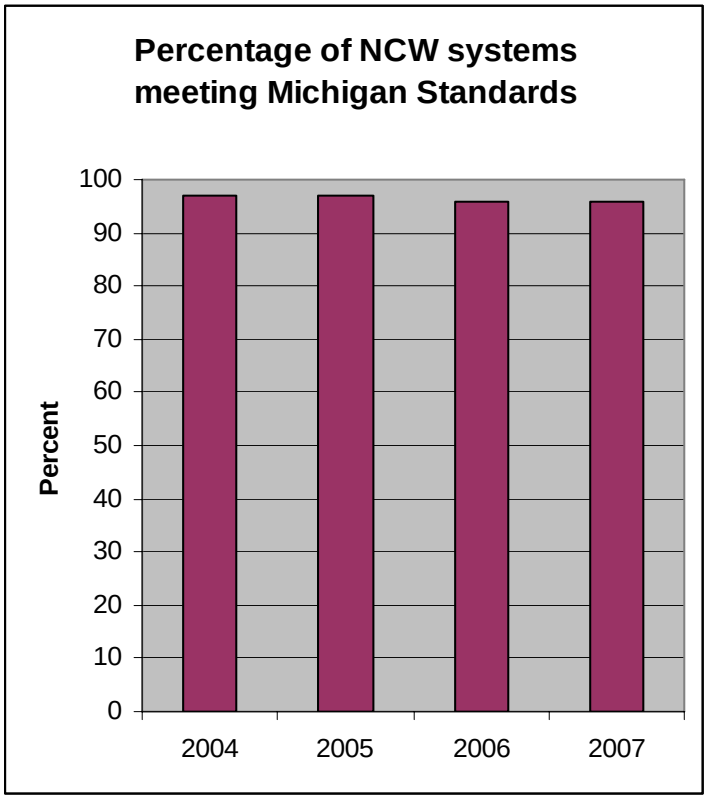
Program Response: By September 30, 2010, develop measures to monitor the time a CWS is not in compliance with health-based standards, and implement actions to minimize this time going forward (measured as the product of time and population served).

How are we doing? Don't know yet.

Comment: This program response has been added due to concerns with achieving Goal 1, and measures are being developed to implement the goal.

Goal 2: By 2015, 100 percent of the noncommunity water systems (NCW) will provide drinking water that meets all applicable health-based drinking water standards through effective treatment and source water protection.

Measure: Percent of NCW with no reported violations of health based standards.



How are we doing? Very Good.
Comments: The results indicate that around 95 percent of the NCW systems are achieving the goal. However, this is a very difficult goal to achieve, partly because there are over 10,000 NCW systems. The nature of our program response may need to be evaluated in this context.

Major Goal 2: Protect Groundwater: Ensure that groundwater is safe to drink, and that groundwater is conserved in adequate quantity to support all uses (drinking water, industrial use).

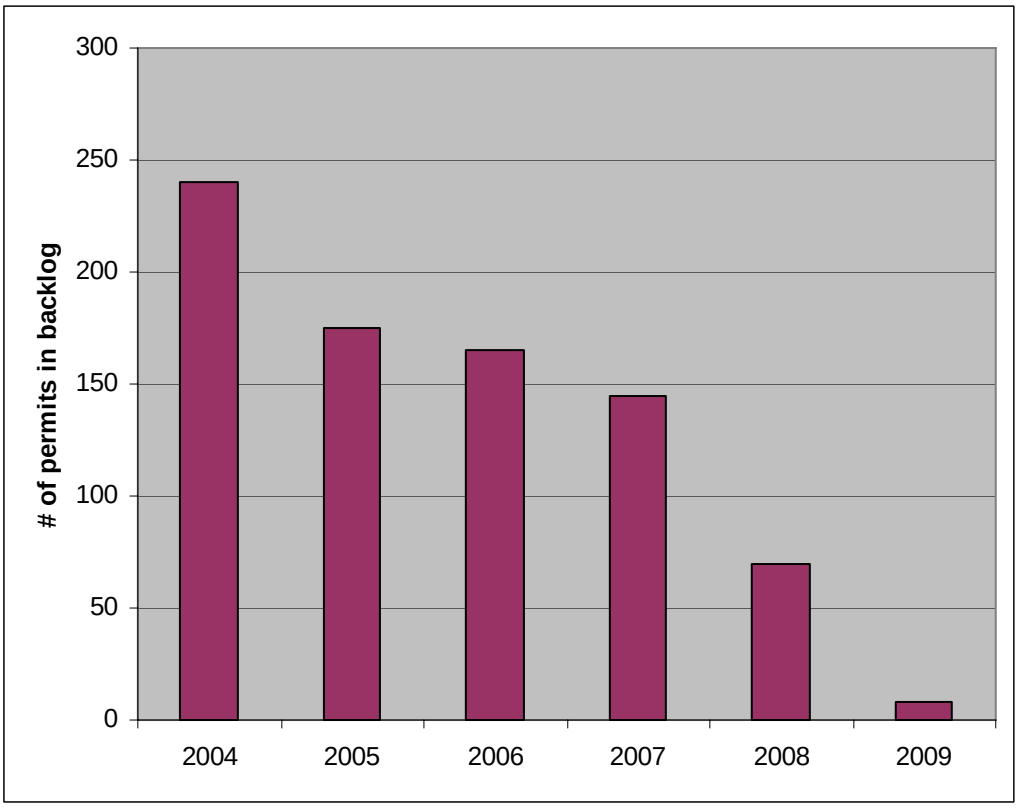
Goal 1: Groundwater meets all applicable health based standards for drinking.

Measure: There currently is no coordinated or compiled groundwater monitoring in Michigan. This needs to be examined and developed.

How are we doing? Don't know yet.
Comment: The DEQ has identified this as an issue to be addressed in the fiscal year 2010 Strategic Plan, with multiple divisions involved. In the interim, we propose the following program responses.

Program Response 1: Groundwater permitting - By 2010 the Groundwater Discharge Permit backlog will be eliminated, meaning that the permits will be timely with up-to-date limits and requirements to protect groundwater.

Measure: Number of Groundwater Discharge Permits that are in the backlog.



How are we doing? Excellent
Comment: The Groundwater Discharge Permit backlog is expected to be eliminated by 2010.

Program Response 2: Groundwater protection - By 2014 permitted groundwater discharges will not be creating or contributing to metals mobilization in groundwater.

Measure: Groundwater Discharge Permits with limits and requirements that prevent metals mobilization in groundwater.
2009 = 92 percent (101 of 110 permits)

How are we doing? Very Good
Comment: There is difficulty in addressing this goal because this is a relatively newly discovered issue that is a result of practices that have been allowed for the past 30 years. This requires some time to understand the issue, develop the knowledge, and implement the practices to address the issue.

Program Response 3: Groundwater Protection – abandoned wells identified at waterline extension sites will be properly plugged and closed to protect drinking water aquifers.

Measure: Percent of abandoned wells properly plugged and closed at waterline extension sites.

How are we doing? Don't know yet.
Comment: Data being compiled to evaluate this.

Program Response 4: Groundwater Protection – All new public and private drinking water wells will be properly constructed to prevent groundwater contamination.

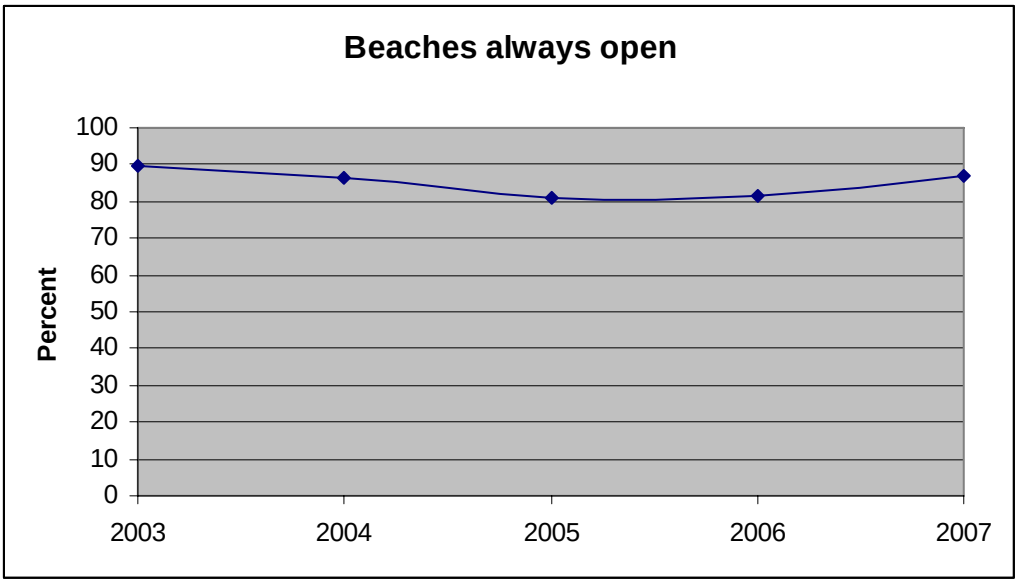
Measure: Percent of new public and private wells that are properly constructed to protect drinking water aquifers.

How are we doing? Don't know yet.
Comment: Data being compiled to evaluate this.

Major Goal 3: Enhance Recreational Waters: Ensure that all recreational waters are safe for human contact.

Goal 1: Clean, safe beaches - By 2014, 100 percent of Great Lakes and inland lake beaches monitored by beach programs will be safe for swimming.

Measure: Percent of monitored beaches with no closures or advisories due to unacceptable levels of *E. coli* during the recreational season.



How are we doing? Good
Comment: This is a relatively new program that has been expanded by the BEACH Act. The monitoring has been implemented and reported consistently now, but the necessary activities to address the problems identified are not always identifiable. As this program matures, this is expected to improve.

Goal 2: Swimmable rivers and streams - All rivers and streams will meet total body contact water quality standards (WQS). This is developed for beaches, but there is no coordinated or compiled monitoring of rivers and streams. This needs to be examined and developed.

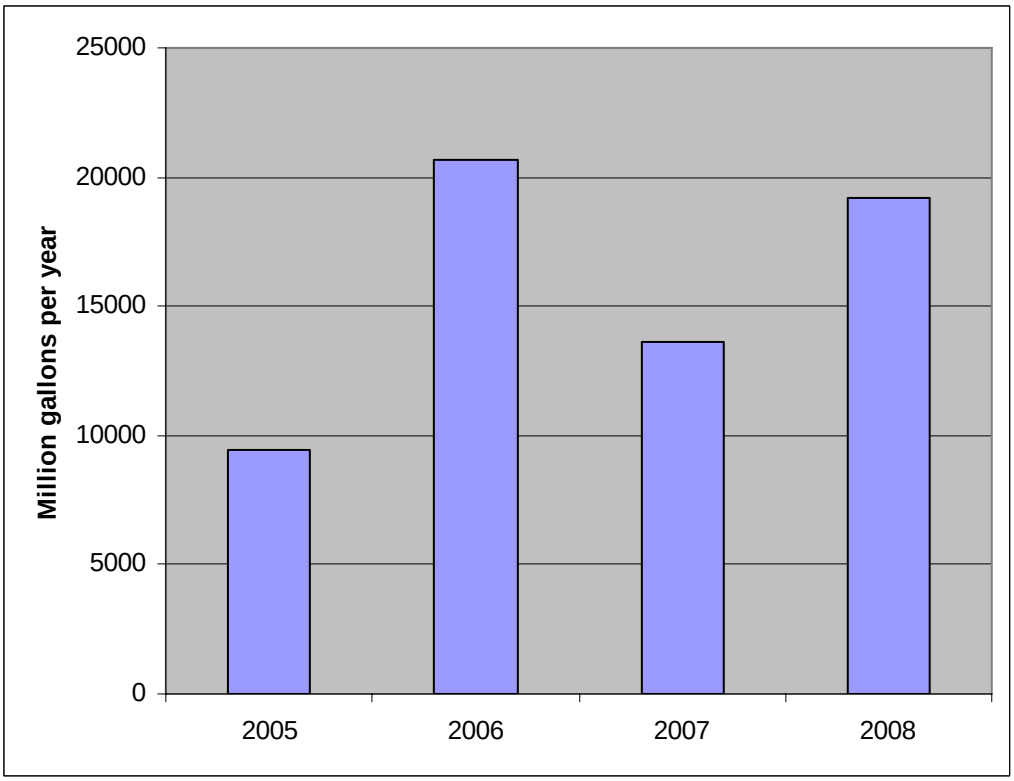
> Measure: Percent of monitored river/stream miles that meet total body contact WQS from future data.

How are we doing? Don't know yet.
Comment:We have just initiated this monitoring. Our intent is to have results available in winter 2010 but high cost may necessitate conducting the monitoring over two or more years, in which case results will be delayed accordingly. We will need to determine how to obtain meaningful data on an ongoing basis. The cost estimate for the first statewide assessment may help us make this determination.

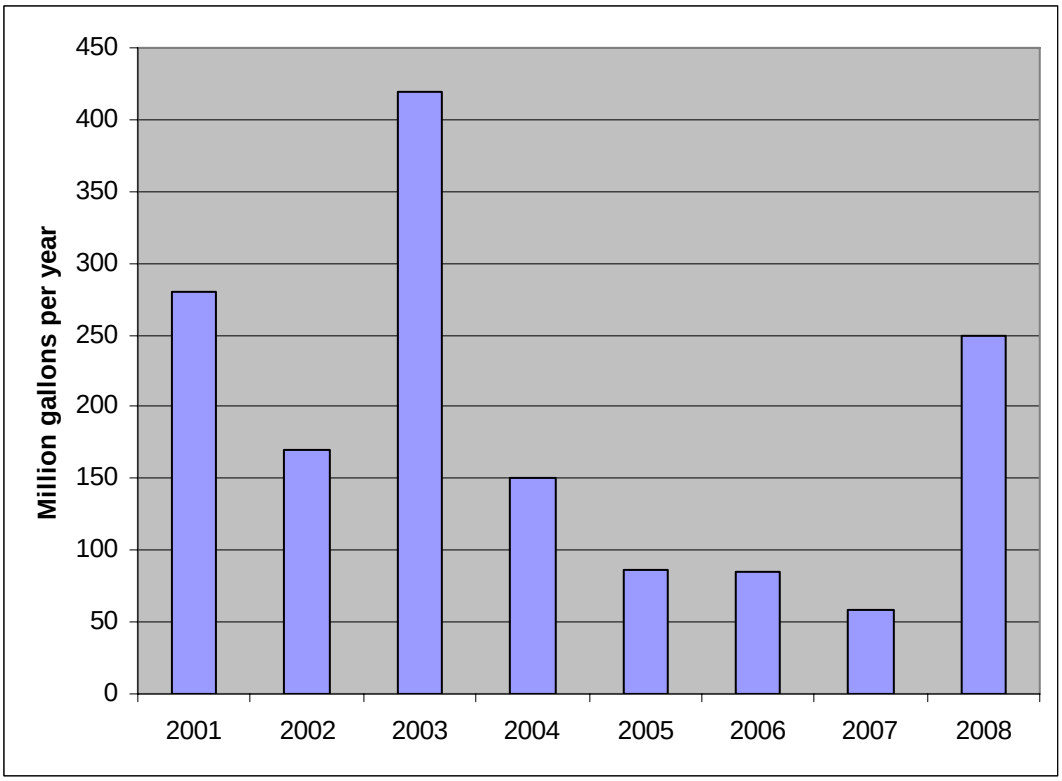
Goal 3: Eliminate untreated sewage discharges - The long-term combined sewer overflow (CSO) goal is complete elimination of untreated CSO discharges. For sanitary sewer overflow (SSO), the goal is to minimize untreated SSO discharges, recognizing that SSOs may occur in a well designed and operated sewer system in response to rainfall that exceeds the 25-year, 24-hour storm (our design storm). An interim goal is to reduce the volume of SSOs discharged annually, from approximately 58 million gallons in 2007

to less than 20 million gallons in 2020, due to events less than the 25-year, 24-hour storm.

Measure: Untreated CSO/SSO discharges



Untreated CSO discharges in million gallons per year.



Untreated SSO discharges in million gallons per year.

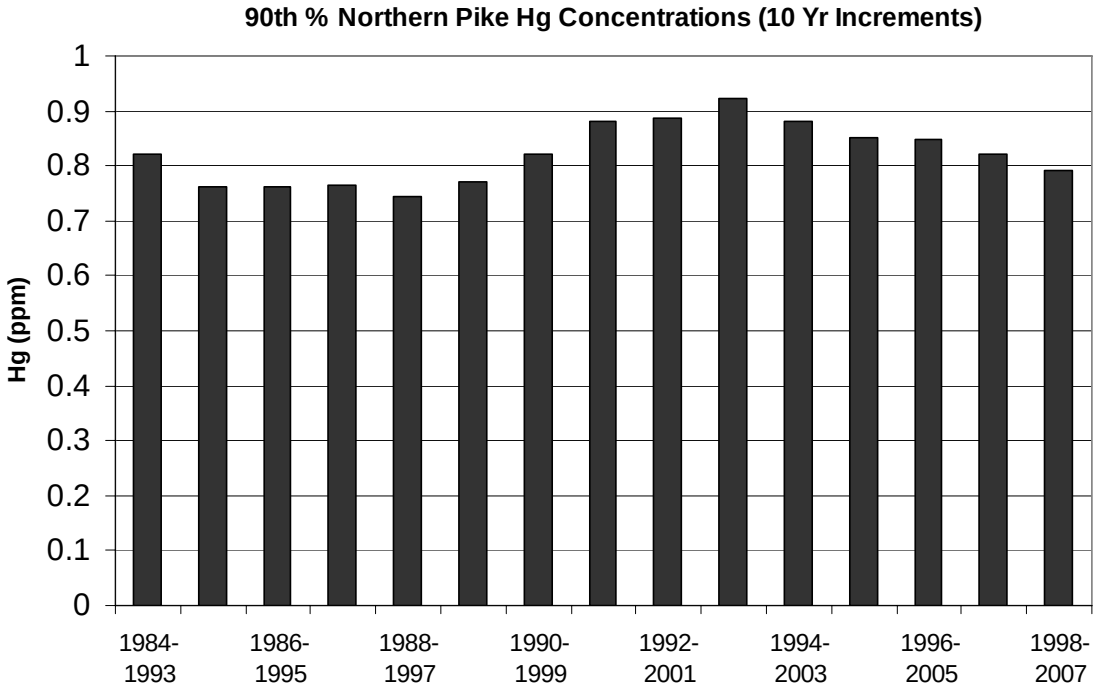
How are we doing? Good.
Comment: There has been considerable progress in Michigan in eliminating untreated discharges of sewage. However, the recent economic downturn is causing delays in some major projects, especially those in Detroit and Dearborn. This will result in additional time to meet this goal.

Major Goal 4: Ensure Consumable Fish: Protect human health and wildlife by reducing exposure to contaminants in fish to levels that are safe.

Goal 1: Eliminate mercury contamination.

Goal 1A: Reduce the mercury levels in edible portions of Great Lakes, inland lakes, and stream fish to below 0.35 mg/kg by 2020.

Measure: Mercury concentrations in the 90th percentile of length normalized walleye, northern pike, or largemouth bass from selected sites in the Great Lakes and inland waters.



Estimated 90th percentile mercury concentrations in standard length northern pike from inland waters of Michigan for consecutive running 10-year periods

How are we doing? Poor
Comment: There has been essentially no change over time. The mercury concentration in these fish appears to be greatly dependent on the mercury from atmospheric deposition, which is primarily due to burning coal to generate electricity. Currently, in Michigan, coal fired power plants discharge about 4,000 pounds of mercury per year to the atmosphere, while point source wastewater facilities discharge about 20 pounds per year to surface waters. Achieving this goal is premised on the DEQ Mercury Strategy being implemented as scheduled (by 2015), with appropriate controls on mercury emissions from burning coal.

Goal 1B: All streams will achieve 1.3 ng/l of total mercury as an annual average ambient concentration by 2020.

> Measure: Percent of rivers/streams monitored that meet 1.3 ng/l.
> 2009: 49 percent. Statistics are based on data from 4 years of a 5 year monitoring program.

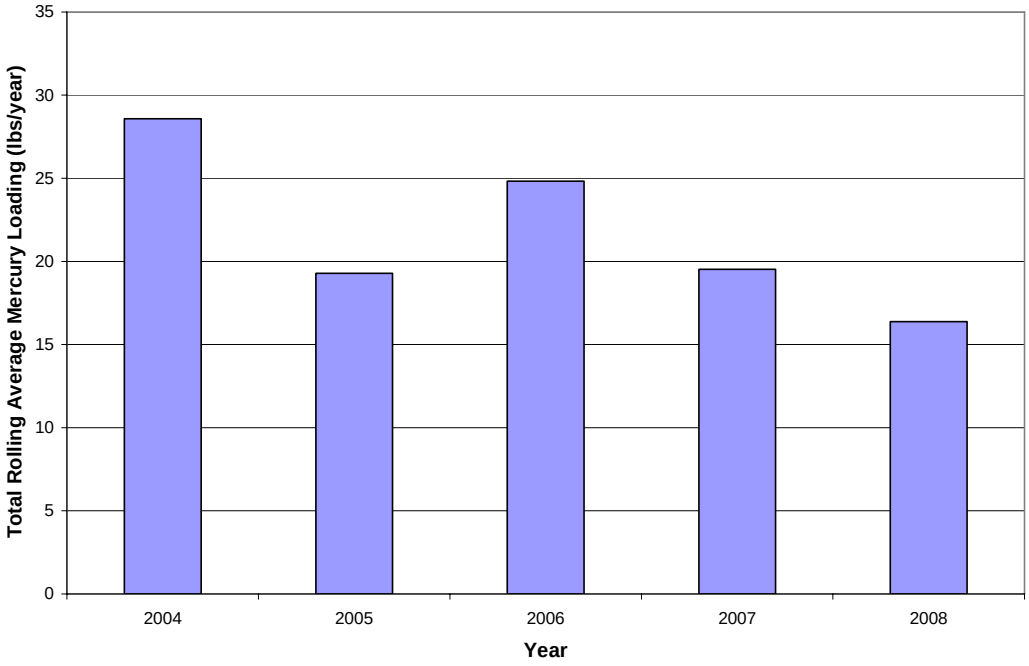
How are we doing? Fair
Comment: Mercury concentrations in flowing waters appear to portray greater progress in controlling mercury than does mercury in fish tissue where it bioaccumulates at levels that may negatively affect human health and wildlife when consumed. Mercury in water also appears to be greatly dependent on the mercury from atmospheric deposition, which is primarily due to burning coal to generate electricity. Achieving this goal is premised

on the DEQ Mercury Strategy being implemented as scheduled (by 2015), with appropriate controls on mercury emissions from burning coal.

Goal 1C: Reduce the load of mercury in permitted point source discharges of mercury with a goal of achieving 1.3 ng/l in all such discharges by 2020.

> Measure: Annual mercury loading from representative wastewater treatment plants.

Figure 4. Five Years of Total Annual Mercury Data from Eleven Wastewater Treatment Plants

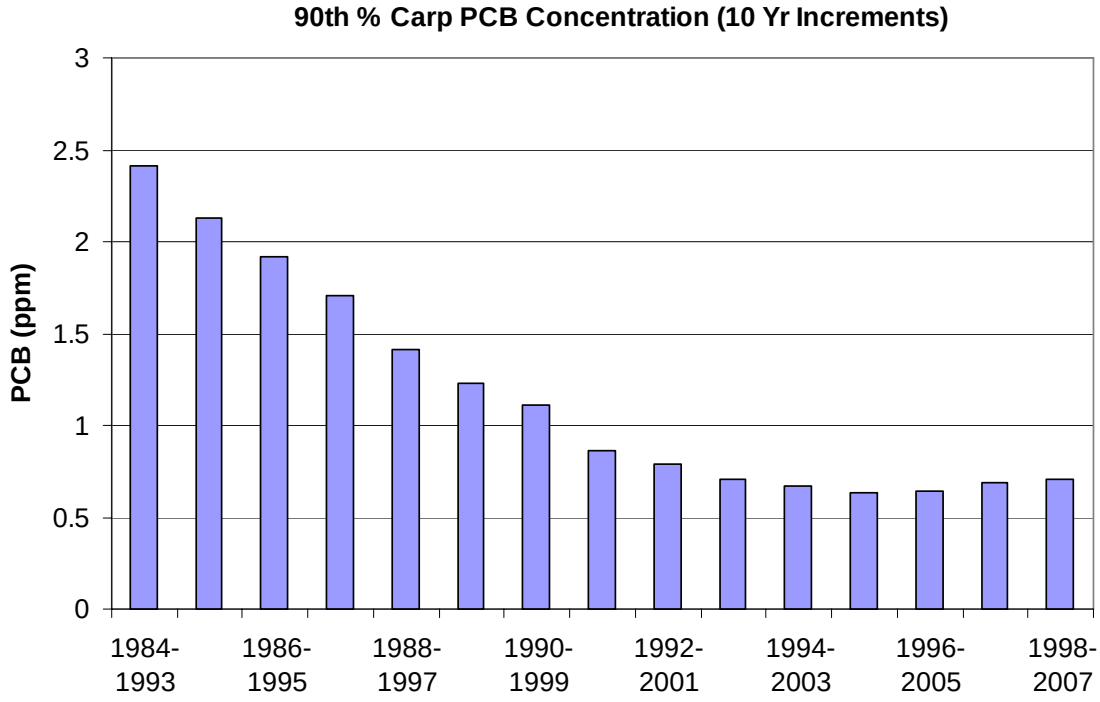


How are we doing? Very good
Comment: These permitted point source discharges all have a requirements to implement mercury minimization plans and eventually meet a discharge limit of 1.3 ng/l. However, these sources of mercury are dwarfed by the amount of mercury that comes into surface waters from atmospheric deposition, generally from the burning of coal.

Goal 2: Eliminate PCB contamination.

Goal 2A: Reduce PCB levels in edible portions of Great Lakes, inland lakes, and river fish to below 0.05 mg/kg by 2025.

> Measure: PCB concentrations in the 90th percentile of lipid normalized carp fillets (site dependent) from selected sites not impacted by legacy pollution.



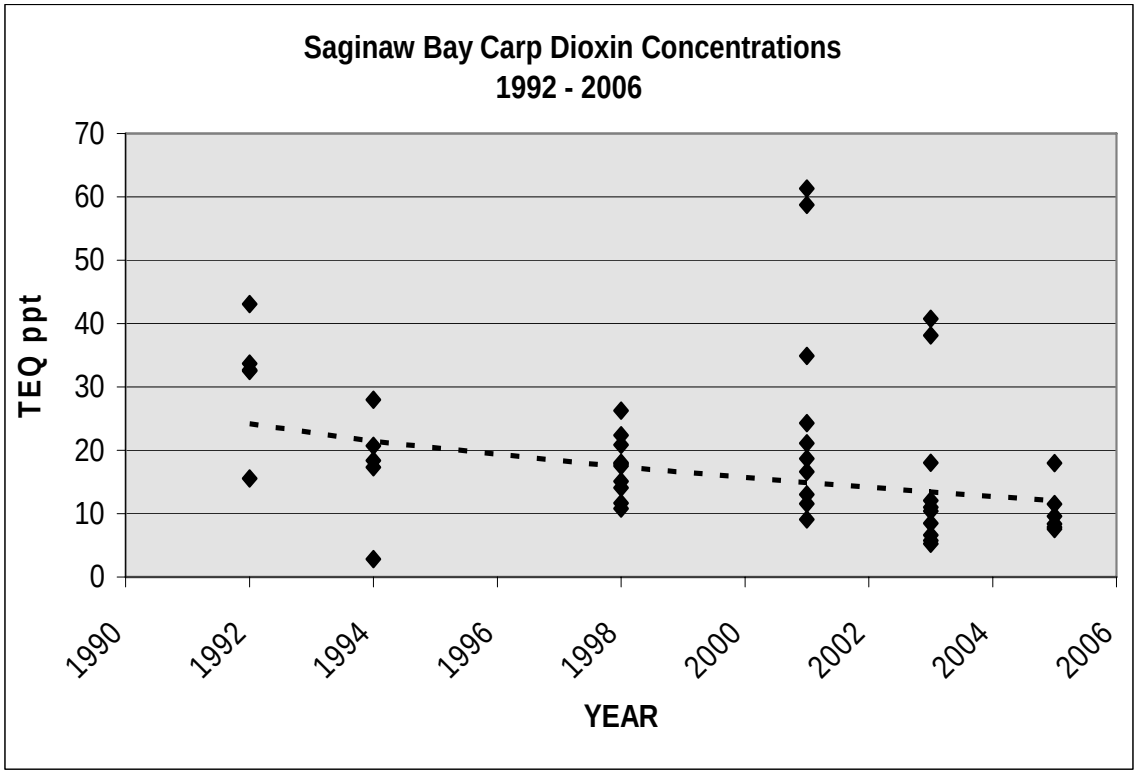
Estimated 90th percentile PCB concentrations in standard lipid carp from inland waters of Michigan for consecutive running 10-year periods.

How are we doing? Very good.
Comment: PCBs have been banned from open use for 30 years. Point source discharges have been controlled, and several sediment remediation activities for PCBs have been completed.

Goal 3: Eliminate dioxin contamination.

Goal 3A: By 2025, achieve an average concentration of .00053 ug/kg dioxin (TEQ) levels in fish in the Saginaw River and Saginaw Bay.

> Measure: Temporal trend in lipid-adjusted dioxin TEQ concentrations in whole carp from Saginaw Bay.



How are we doing? Good.
Comment: The primary point source discharge of dioxin has been controlled, a large PCB sediment remediation of the Saginaw River was completed that likely removed dioxins as well, several hot spots of sediment contaminated with dioxin have been removed from the Tittabawassee River, and the downward trend in dioxin concentrations is expected to continue. Additional sediment remediation actions are being planned for the Tittabawassee and Saginaw Rivers and associated floodplains.

Major Goal 5: Protect and Restore Aquatic Ecosystems: Restore and maintain watersheds, and their aquatic ecosystems to provide healthy habitat for fish, plants, and wildlife.

Goal 1: Ensure healthy aquatic biota: Through 2015, ensure that the condition of the state's wadeable streams does not degrade, such that there is no statistically significant increase in the percent of streams rated "nonattaining," and no statistically significant decrease in streams rated "attaining."

> Measure: The trend in attainment status of the other aquatic life and wildlife designated use based on benthic macroinvertebrate communities; percent monitored waters attaining the designated use based on an assessment of the benthic macroinvertebrate communities.

Data from 2008 indicate that 88 percent of river miles support healthy benthic macroinvertebrate communities.

How are we doing? Status – good. Trend – unknown.
Comment: The statewide status assessment is based on only one year's data of a five year monitoring plan. The percentage of river miles supporting healthy benthic communities and the confidence interval are expected to change when data from all five years are evaluated. Statewide trend data will not be available until 2014 or 2015.

Goal 2: Protect natural hydrology: Assure that new water withdrawals do not create an adverse resource impact on surface water bodies.

> Measure: Percent of new water withdrawals registered that do not cause an adverse resource impact.

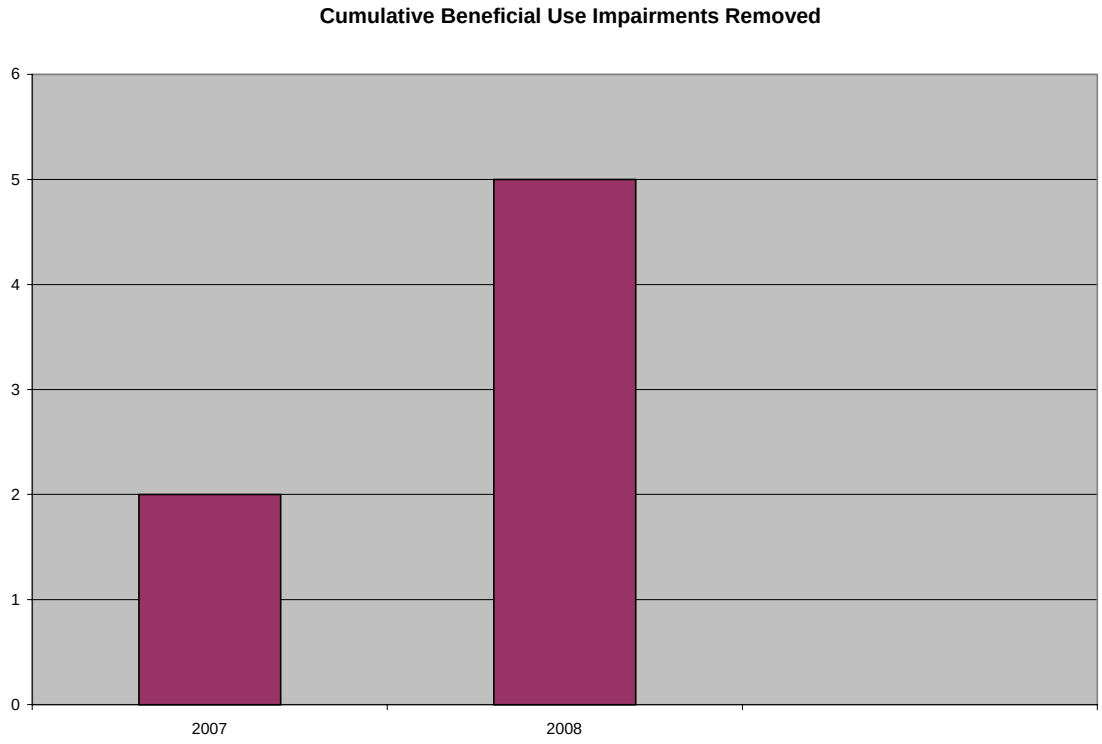
Result: To early to tell. The Water Withdrawal Assessment for rivers and streams has been required for use since July 2009.

How are we doing: Don't know yet.
Comment: The development of the Water Withdrawal Assessment Tool is a major accomplishment toward achieving this goal. However, there is currently some question as to whether the state will have the resources available to implement this program.

Goal 3: Protect the Great Lakes.

Goal 3A: By 2014, remove ten beneficial use impairments within areas of concern in Michigan.

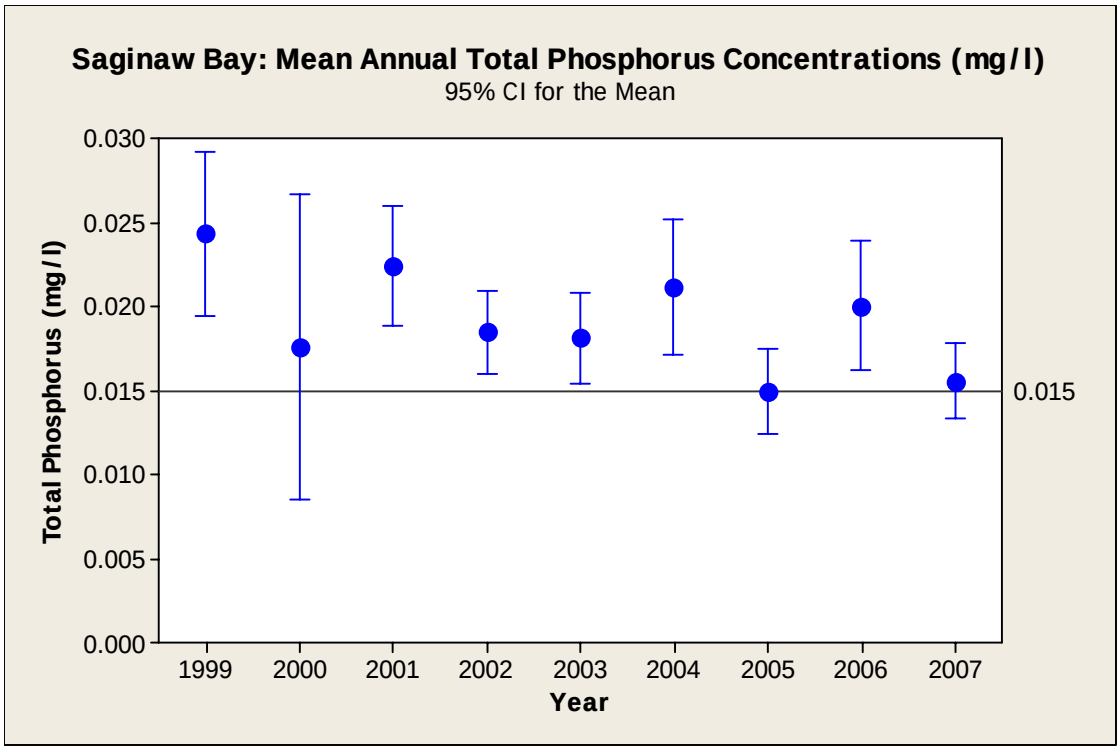
> Measure: Cumulative number of beneficial use impairments removed.

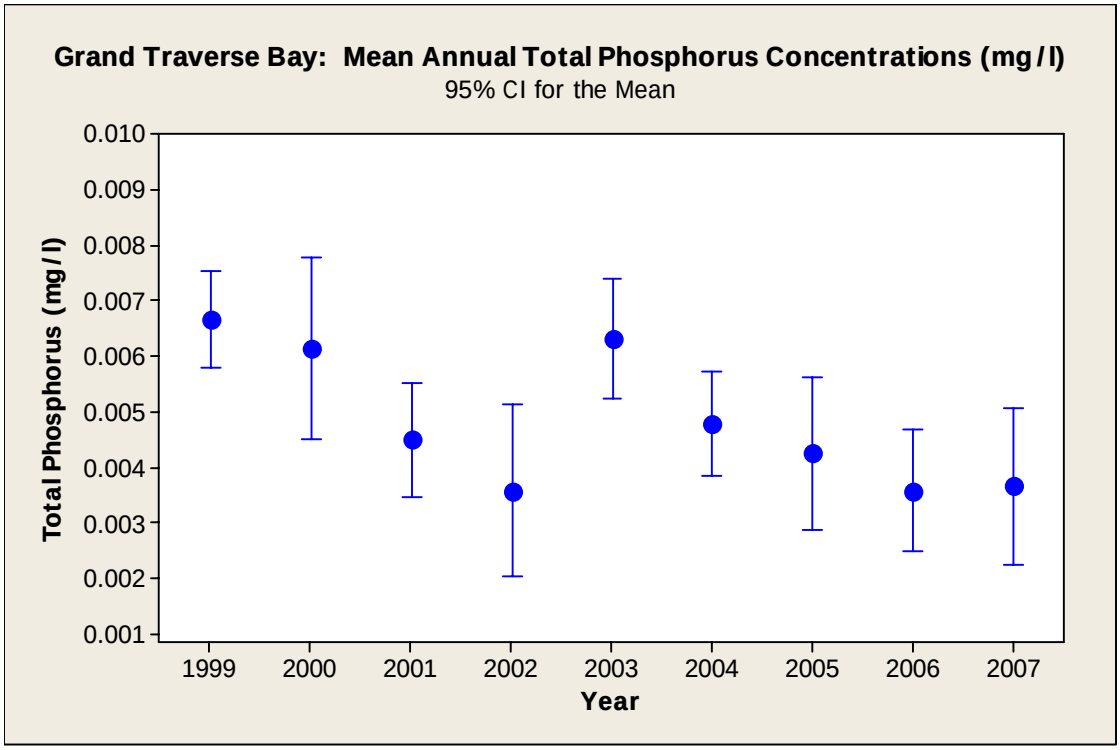


How are we doing? Very Good.
Comment: This goal is expected to be met, especially with the advent of the Great Lakes Restoration initiative.

Goal 3B: Meet the total phosphorus goal in Saginaw Bay of 15 ug/l and maintain a neutral trend in total phosphorus in Grand Traverse Bay.

> Measure: Phosphorus concentrations and trends in Grand Traverse and Saginaw Bays.





How are we doing? Excellent for Grand Traverse Bay; good for Saginaw Bay.
Comment: In Saginaw Bay, the phosphorus reductions have occurred slowly. Recent efforts have been refocused by the Saginaw Bay Coastal Initiative including the "muck"

on the beach issue. However, the presence of invasive species such as the zebra mussel and quagga mussel, changing lake levels and other factors have complicated this situation. Additional studies are underway to try to further understand these interactions.

Goal 3C: Prevent future introductions of aquatic invasive species into the Great Lakes.

> Measure: Reduce the rate of introduction of aquatic invasive species into the Great Lakes to one species every 30 years.

Result: Data being compiled. In the interim we have developed a program response based on Michigan's ballast water permit program.

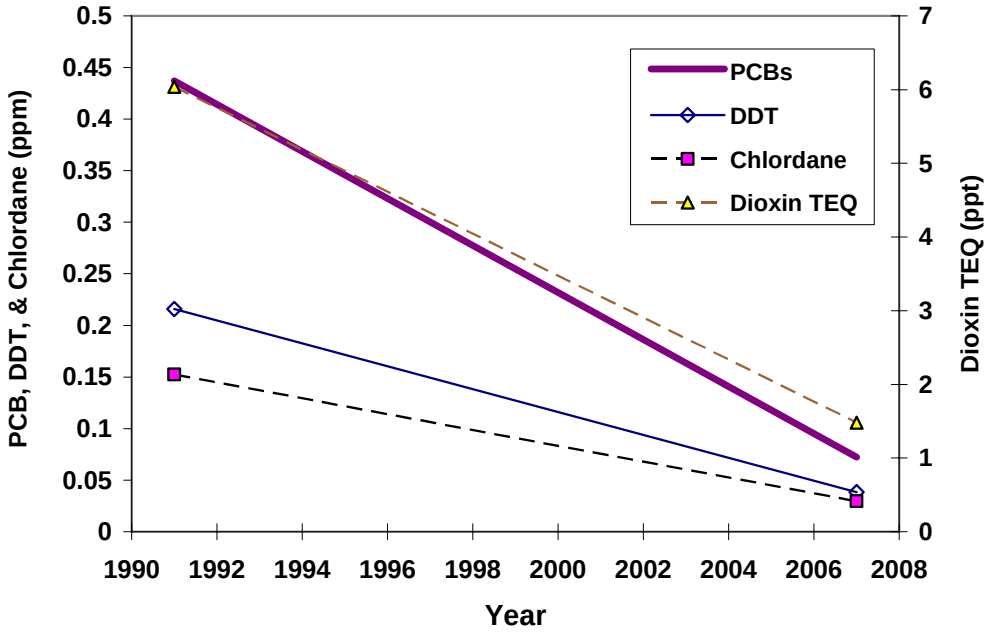
Program Response: The number of ocean going vessels under the Michigan ballast water permit.
2009: 110

How are we doing? Excellent on Michigan's permit, but overall effectiveness is doubtful.

Comment: Michigan has led the nation in efforts to prevent future introduction of aquatic invasive species into the Great Lakes. However, support from the federal government and Canada is needed to accomplish this goal, and that support has been very slow in coming. A recently issued permit by the U.S. EPA is a step in the right direction.

Goal 3D: Enhance the quality of the Outstanding International Resource Waters – Lake Superior Basin.

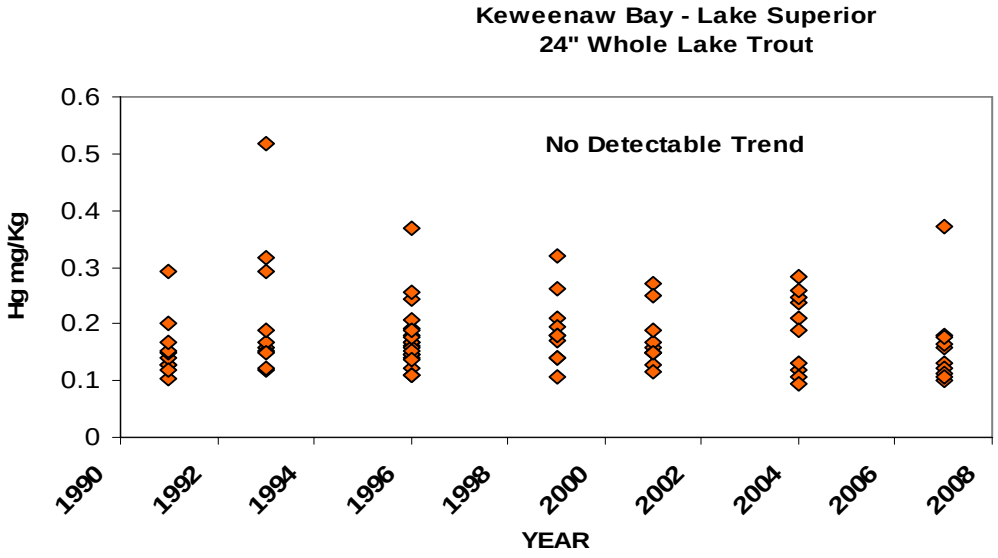
> Measure: Temporal trend in concentrations of PCB, DDT, chlordane, and dioxins in Lake Superior (Keweenaw Bay) lake trout, with a goal of maintaining measurable declines.



Temporal trends in Lake Superior lake trout contaminant concentrations.

How are we doing? Excellent
Comment: We expect these declines to continue.

Measure: Concentrations of mercury from Lake Superior lake trout, with a goal to begin showing measurable declines by 2020.

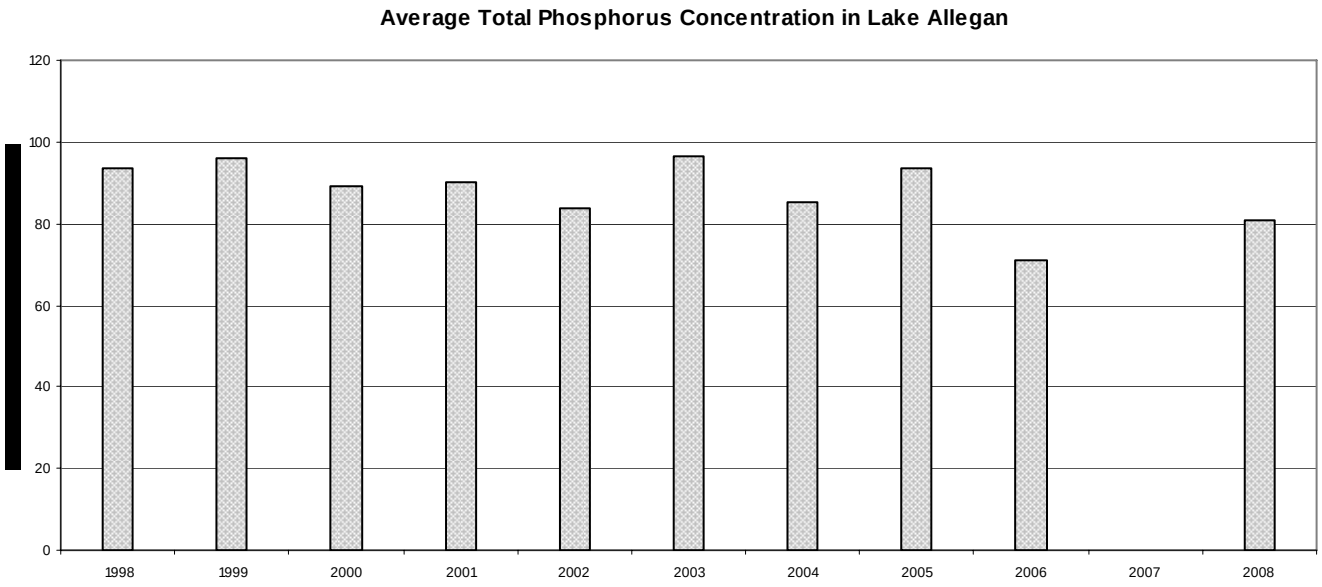


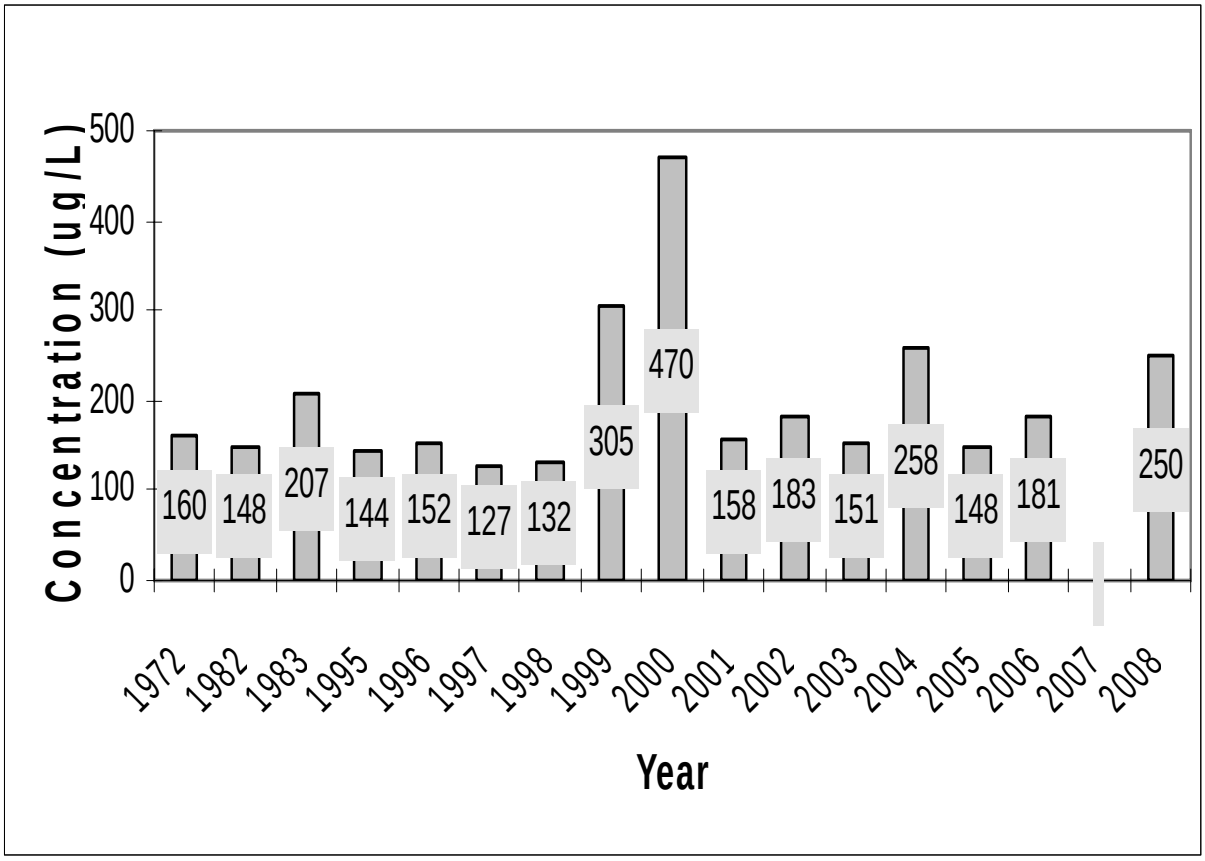
Temporal trend in whole Lake Superior lake trout mercury concentration.

How are we doing? Good.
Comment: Although there is no detectable downward trend in mercury concentrations in whole lake trout from Lake Superior, they are not increasing as they are in the other Great Lakes.

Goal 4: Achieve the nutrient total phosphorus levels for the following impaired lakes: Lake Allegan (60 ug/l) and Lake Macatawa (50 ug/l), with a goal of achieving these levels by 2020.

Measure: Total phosphorus level in the lake.





Lake Macatawa total phosphorus concentrations by year.

How are we doing? Poor for Lake Macatawa, and fair for Lake Allegan.
Comment: Lake Allegan might be showing some signs of a decline in phosphorus levels. The point sources have reduced their phosphorus discharges, and nonpoint source reduction efforts have been underway. However, Lake Macatawa does not show any evidence of a decline in phosphorus levels in spite of several activities undertaken to reduce nonpoint source phosphorus.